

PAM 550.341

LAMONT GEOLOGICAL OBSERVATORY  
COLUMBIA UNIVERSITY  
PALISADES, NEW YORK

SEISMOLOGICAL BULLETIN

By

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L.G.O. Contribution No. 502

POLAR  
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1607

## STATION CONSTANTS

Latitude: 41° 00' 25" North  
Longitude: 73° 54' 31" West  
Elevation: 102.59 meters  
Bedrock: Palisades diabase Triassic Age

### Abbreviations

i = sudden beginning of the motion (impetus)  
e = gradual beginning of the motion (emersio)  
Lg = short period continental surface shear wave  
Rg = continental Rayleigh wave  
Comp. = compression  
Dil. = dilatation

All times are G. C. T.

Time - I.B. M. Invar pendulum clock corrected by Naval Observatory time signals every six hours.

### METHOD OF COMPUTING MAGNITUDES AT PALISADES

Magnitudes at Palisades are computed from Gutenberg's<sup>1</sup> formula:

$$M \text{ (magnitude)} = \log A - \log B + C + D$$

where

A = the maximum amplitude in microns for surface waves with periods of about 20 seconds. If the horizontal ground motion is used, A is obtained from the square root of the sum of the squares of the maximum ground amplitudes on the E-W and the N-S recordings.

In the rare cases where horizontal component instruments are not available, the vertical component alone is used. In general, records from the wide-band, long-period instruments with pendulum periods of 30 seconds and galvanometer periods of 100 seconds are used. In special cases where instruments of  $T_0 = 15$  sec,  $T_g = 75$  sec are used, the readings are preceded by an asterisk.

- log B is determined from tables by Gutenberg of - log B for varying epicentral distances.

C and D are presently taken as 0 for Palisades. C is a station constant, D depends on depth of focus, radiation pattern, absorption, and irregularities.

At present magnitudes are computed only for shallow shocks.

1. Gutenberg, B. Amplitudes of surface waves and magnitudes of shallow earthquakes. Bulletin of Seismological Society of America, Vol. 35, No. 1, January 1945.

Instruments

Three component Columbia University seismographs.  
To = 12 sec., Tg = 15 sec.

Three component Benioff seismographs. Short-period, To = 1 sec.,  
Tg = 0.2 sec. Long-period, To = 1 sec., Tg = 75 sec.

One Columbia University vertical seismograph. To = .33 sec.,  
Tg = 0.2 sec.

Three component Columbia University visual recording seismographs,  
To = 12 sec.

One Columbia University vertical seismograph for visual recording,  
To = 1 sec.

Three component Columbia University long-period seismographs,  
To = 15 sec., Tg = 75 sec.

Three component Columbia University long-period seismographs,  
To = 30 sec., Tg = 100 sec.

Three component Columbia University long-period seismographs. (1)  
To = 30 sec., Tg = 100 sec. P<sub>2</sub> to 20 September, 1960.

Z component To = 30 sec., Tg = 100 sec. P<sub>2</sub> from 20 September,  
1960 to 31 December, 1960.

Three component Columbia University long-period seismographs, (2)  
To = 30 sec., Tg = 100 sec. P<sub>2F</sub> from 20 September, 1960 to  
31 December, 1960.

Two Columbia University microbarographs, To = 10 sec., Tg = 75 sec.

- (1) Seismographs of High Magnification at Long Periods. G. Sutton and J. Oliver. Annales de Geophysique, Tome 15, No. 4, 1959, p. 423-433.
- (2) The Use of Galvanometers as Band-rejection Filters in Electro-magnetic Seismographs. P. W. Pomeroy and G. H. Sutton. Seism. Soc. Amer. Bull., v. 50, p. 135-151.



Palisades, New York				1			1961		
Date	Phase	h	m	s	Date	Phase	h	m	s
Jan. 1	eLR	21	51	06	Jan. 3	e eLR	12	23	36
2	eS	03	39	36		Banda Sea	12	34	06
	eSS	03	45	16					
	eLQ	03	51	06	3	eLR	18	40	06
	eLR	03	56	06		New Britain			
	Off coast Chile								
	USCGS 03 16 41.0				5	iP	14	17	12
	41.4°S 88.8°W	Dist.	82.7°			P (Z) 9 sec 5 mic comp NW			
	Depth 25 km					epP	14	17	15
2	eP	10	27	06		ePP	14	19	34
	ePKP	10	30	34		iS	14	25	50
	ePP	10	31	58		ePS	14	26	22
	eSKKKS	10	39	56		ePPS	14	26	54
	eScSP	10	41	42		eScS	14	27	06
	ePS	10	42	18		eSS	14	30	24
	ePKKS	10	44	38		eLQ	14	35	46
	eSS	10	48	18		eLR (NW)	14	39	06
	eSKKKS	10	51	36		Aleutian Islands			
	eLQ	11	01	46		USCGS 14 06 25.8			
	eLR (WNW)	11	08	06		51.6°N 176.3°W	Dist.	65.4°	
	eLQ <sub>2</sub>	12	02	06		Depth 37 km	Mag	6 1/4-6 1/2	
	eLR <sub>2</sub>	12	04	46		Z 35, E 40, N 45*			
	Santa Cruz Islands								
	USCGS 10 11 56.9				5	ePKP	16	12	58
	12.4°S 166.4°E	Dist.	120.4°			epPKP	16	13	37
	Depth 161 km	Mag	6 1/4-6 1/2			ePKS <sub>1</sub>	16	16	09
	Z 16, E 21, N 14					ePKS <sub>2</sub>	16	16	13
2	eLQ	21	46	06		e(pPKS)	16	16	21
	eLR	21	54	06		ePPP	16	17	13
	New Britain region					ePS	16	25	49
3	eLR (NW)	00	09	26		e(ScSPKP)	16	28	33
	Solomon Islands					eSS	16	33	05
3	eLR	01	43	36		eLQ	16	48	05
						eLR (NW)	16	54	25
	New Guinea								
3	eLQ	06	59	16		USCGS 15 53 56.0			
	eLR (S)	07	04	06		4.1°S 143.0°E	Dist.	130.4°	
						Depth 108 km	Mag	6	
						Z 8, E 7, N 10			
3	eS	08	28	26	5	ePKP	18	16	44
	eLQ	08	34	26		ePP	18	18	29
	eLR (SE)	08	36	36		ePKS	18	19	57
	Mid-Atlantic Ocean					eSKS	18	23	45
	USCGS 08 10 40.4					eSKKS	18	25	25
	1.1°N 29.2°W	Dist.	56.8°			ePKKP	18	27	25
	Depth 25 km					ePS	18	28	25
3	eLQ	08	58	36		ePPS	18	29	57
	eLR	09	05	46		eSS	18	35	25
						eLQ	18	49	45
						eLR (NW)	18	56	35

Palisades, New York				2		1961				
Date	Phase	h	m	s	Date	Phase	h	m	s	
Jan. 5	Loyalty Islands USCGS 17 57 56.6 21.2°S 169.3°E Depth 123 km Z 27, E 30, N 23					Jan. 7	eLR	07	50	05
5	ePKP	18	33	31		ePP	18	35	37	
	e (SKS)	18	39	35		ePS	18	44	45	
	ePKKS	18	46	45		eSS	18	50	25	
	eSS	18	50	17		eLQ	19	00	05	
	eSKKS	18	52	35		eLR (SSE)	19	06	05	
	eSSS	18	59	05		Sandwich Islands				
	eLR (NW)	19	13	05		USCGS 18 16 51.2				
	Loyalty Islands USCGS 18 14 43.0 21.0°S 169.1°E Depth 124 km					57.2°S 25.3°W	Dist. 105.9°			
						Depth 94 km	Mag 5 1/2			
						Z 1, E 2, N 2				
5	e	19	17	37	8	e	03	35	25	
	eLR (SE)	20	01	35	8	eLQ	03	53	05	
6	eLR	00	19	05	8	eLR (SE)	04	00	05	
6	eLR Kermadec Islands	00	57	05	8	eLR (SW)	08	35	05	
6	eLR (W)	01	32	05	8	eLR	21	12	05	
6	eLQ eLR Hokkaido, Japan	02	02	05	9	eLR (SW)	22	02	05	
		02	04	05	9	eLR (SE)	00	09	25	
						North Atlantic Ocean				
						USCGS 03 08 37.7				
						31.2°N 41.0°W	Dist. 28.2°			
						Depth 49 km	Mag 4 3/4			
						Z 5, E 7, N 3				
6	eLR	05	52	05	9	eLR	03	21	45	
6	eLQ eLR Aleutian Islands	06	51	05	9	eLR	04	11	05	
		06	55	35	9	eLR	04	41	15	
6	eLR Kamchatka	07	52	05	9	eLR (SW)	06	22	05	
						Kermadec				
6	eLR (E)	08	56	35	9	eLR (SW)	08	56	05	
6	eLR	10	21	05	9	Z 2, E 3, N 2.5	11	15	05	
6	eLR South coast Mexico	11	04	05	9	eP	19	27	49	
						eS	19	32	05	
						eLQ	19	33	05	
						eLR (SE)	19	34	05	
6	eLR	11	42	25		Leward Islands				
6	eLR	13	35	05		USCGS 19 22 05.6				
6	eLR	17	03	05		17.8°N 61.0°W	Dist. 25.4°			
						Depth 31 km	Mag 4 1/2			
						Z 2.0, E 3.5, N 3.0				

Palisades, New York				3		1961			
Date	Phase	h	m	s	Date	Phase	h	m	s
Jan. 9	eLR Outer Mongolia	23	00	25	Jan. 14	eLR (W)	01	48	03
10	eLR	03	15	05	14	eLQ eLR (NW) Aleutian Islands	02	56	03
10	eLR	05	20	05	14	eLR (NW)	03	04	03
10	iP	14	34	24		New Ireland region	06	34	03
	P (Z) 10 sec 3.5 mic comp NW								
	epP	14	34	37	14	eP	16	48	47
	ePP	14	37	25		eS	16	56	47
	ePPP	14	39	37		ePS	16	57	03
	eS	14	44	19		ePPS	16	57	23
	ePPS	14	44	55		eScS	16	58	19
	eSS	14	49	31		eSS	17	00	39
	eSSS	14	53	53		eSSS	17	03	19
	eLQ	14	56	05		eLQ	17	04	03
	eLR (NW)	15	00	25		eLR (NW)	17	06	23
	Kurile Islands					Unimak Island region			
	USCGS 14 22 18.2					USCGS 16 38 55.6			
	49.9°N 156.2°E					53.9°N 163.7°W			
	Dist. 79.3°					Depth 41 km			
	Depth 29 km Mag 6 1/4-6 1/2					Mag 5 3/4			
	Z 22.5, E 45, N 40					Z 9.5, E 13, N 14.5			
11	eP	12	10	21	14	e	20	19	13
	epP	12	10	34		e	20	19	35
	ePcP	12	11	20					
	eS	12	18	48	15	eLQ eLR (SW)	02	06	33
	eScS	12	20	26			02	15	33
	eSS	12	23	04					
	eLQ	12	25	54	15	eLR	05	05	03
	eLR (NW)	12	27	56					
	Fox Islands, Aleutians				15	eS	06	06	03
	USCGS 11 59 55.0					eLR (E)	06	09	03
	51.8°N 171.0°W					Leeward Islands			
	Dist. 62.8°					USCGS 05 56 15.1			
	Depth 47 km Mag 5 3/4-6					17.4°N 61.2°W			
	Z 18, E 28, N 30					Dist. 26.4°			
						Dept. 60 km			
11	eLQ	22	36	04					
	eLR	22	44	34	15	eLR	11	26	03
	MacQuarie Islands								
12	eLR	06	19	24	15	eLR	12	52	03
	New Hebrides								
					15	eLR	17	05	51
12	eLQ	19	51	24	15	ePKKP	17	13	03
	eLR (SW)	19	55	04		e (PS)	17	15	43
13	e	19	57	23		e PPS	17	16	39
	e	20	02	11		ePKKS	17	17	03
	eLQ	20	11	03		eScSPKP	17	18	13
	eLR	20	15	03		eSS	17	21	57

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Date	Phase	h	m	s	Date	Phase	h	m	s
Jan. 15	e (SKPPKP)	17	23	43	Jan. 16	Honshu, Japan			
(cont'd)	eSSS	17	25	47	(cont'd)	USCGS 12 12 34.4			
	eSSSS	17	28	55		36.2°N 141.7°E			
	eLQ	17	36	27		Depth 105 km Mag 6 1/4 - 6 1/2			
	eLR (NNW)	17	42	03		Z 23, E 30, N 25			
Loyalty Islands region									
	USCGS 16 44 44.8				16	eLQ	14	48	23
	20.4°S 169.5°E					eLR	14	54	03
	Depth 182 km					Honshu, Japan			
16	eS	04	10	43	16	eSKS	16	05	55
	eLQ	04	13	43		eSKKS	16	06	19
	eLR (SW)	04	17	03		ePS	16	07	21
Near coast Mexico									
	USCGS 03 58 52.5					eSS	16	12	31
	18.2°N 102.4°W					eSSS	16	18	23
	Depth 153 km					eLQ	16	21	43
						eLR (N)	16	27	03
						Honshu, Japan			
16	eP	07	33	37		USCGS 15 41 23.3			
	ePP	07	37	37		36.4°N 140.6°E			
	ePPP	07	40	11		Depth 147 km			
	ePKS	07	42	17		Z 10, E 28, N 15			
	eSKS	07	44	55					
	eSKKS	07	45	15	17	eLQ	02	37	23
	ePS	07	46	29		eLR	02	44	03
	eSS	07	51	43					
	eLQ	07	59	03	17	eLQ	08	56	03
	eLR (N)	08	05	03		eLR	09	00	03
Honshu, Japan									
	USCGS 07 20 18.6				17	eLR	14	27	03
	36.0°N 141.1°E								
	Depth 131 km Mag 6 1/2-6 3/4				17	e	18	36	42
	Z 32, E 60, N 50					eLQ	18	55	22
						eLR (W)	19	02	02
16	eSKKS	11	44	33					
	eLQ	12	01	03	17	ePP	23	26	18
	eLR (N)	12	05	03		ePS	23	35	54
Honshu, Japan									
	USCGS 11 19 46.5					ePPS	23	37	52
	35.7°N 140.6°E					eSS	23	43	02
	Depth 157 km					e	23	47	02
						eLQ	23	55	18
						eLR (NW)	23	59	22
16	eSKS	12	37	15					
	ePS	12	38	41					
	eSS	12	44	03					
	eSSS	12	49	35					
	eLQ	12	53	03					
	eLR (N)	12	58	03					
	(continued)				18	e (L)	08	05	02
						Honshu, Japan			

Palisades, New York		5			1961				
Date	Phase	h	m	s	Date	Phase	h	m	s
Jan. 18	eLQ	08	21	52	Jan. 20	eLQ	02	08	32
	eLR	08	28	02	(cont'd)	eLR (W)	02	10	22
	Honshu, Japan					Off coast Mexico			
18	eLR (NW)	10	07	02		USCGS 01 51 56.6			
	New Hebrides					20.3°N 108.6°W			
						Depth 84 km			
						Z 2.5, E 2.5, N 5.0			
18	eLQ	16	04	22					
	eLR (W)	16	07	02	20	eLR	05	51	32
	Tonga Islands					Kodiak, Alaska			
18	eLQ	21	42	12					
	eLR (W)	21	45	02	20	eLR	08	39	02
19	ePS	04	51	30	20	eLR	14	01	42
	eSS	04	59	02		Kodiak Islands, Alaska			
	eSKKS	05	02	42					
	eSSS	05	07	38	20	eP	17	18	30
	eLQ	05	12	22		eS	17	25	38
	eLR (NW)	05	18	32		eSS	17	29	34
	New Hebrides Islands region					eLQ	17	32	32
	USCGS 04 21 16.0					eLR	17	36	32
	14.4°S 166.7°E	Dist. 120.9°				Kodiak, Alaska			
	Depth 26 km	Mag 6				USCGS 17 09 15.7			
	Z 2.0, E 3.5, N 2.5					56.4°N 152.3°W			
						Depth 46 km			
19	eLQ	06	45	22					
	eLR (NW)	06	52	02	20	eLR	21	58	02
	Loyalty Islands					Kodiak, Alaska			
19	eLR	07	58	02					
					21	eLR	22	20	32
19	eP	17	34	22					
	eS	17	44	16	22	e (P)	03	39	30
	ePS	17	44	42		ePP	03	44	18
	eSS	17	50	22		ePPP	03	47	02
	eSSS	17	54	10		eSKS	03	50	06
	eLQ	17	56	02		ePS	03	54	18
	eLR (NW)	18	01	02		ePPS	03	56	02
	Kurile Islands					eSS	04	00	42
	USCGS 17 22 16.9					eSSS	04	05	02
	49.7°N 155.8°E	Dist. 80.2°				eLQ	04	14	02
	Depth 31 km	Mag 5 1/4-5 1/2				eLR (NW)	04	20	02
	Z 2.5, E 4.0, N 3.5					eLR <sub>2</sub> (SE)	05	16	32
						Santa Cruz Islands region			
19	eLR	21	23	02					
						USCGS 03 24 04.5			
20	eLR	01	25	02					
	Kodiak, Alaska					11.9°S 166.2°E			
						Depth 25 km			
						Z 72, E 105, N 75			
20	eS	02	04	18	22	eLR	13	52	02
	ePcS	02	05	02					
	eSS	02	07	12	22	eLR	14	39	02

## Palisades, New York

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Date	Phase	h	m	s	Date	Phase	h	m	s
Jan. 30 (cont'd)	Central Alaska USCGS 12 12 39.7 65.2°N 149.9°W Depth 34 km Z 5.5, E 11, N 14				Feb. 1 (cont'd)	Depth 42 km Z 6, E 14.5, N 17.5			
									Mag 5 1/2
31	eP	00	57	50					
	ePcP	00	58	36					
	ePP	00	59	54	1	eLR	07	26	24
	ePPP	01	01	18		New Hebrides			
	e	01	04	22					
	eS	01	05	08	1	eLQ	08	05	04
	eScS	01	07	36		eLR (NW)	08	08	24
	eSS	01	09	44		Rg	08	11	28
	eLQ	01	12	04		Z 2.5, E 2.5, N 3.0			
	eLR (NW)	01	15	04					
	Near Kodiak, Alaska USCGS 00 48 36.5 55.8°N 153.9°W				1	eLQ	12	30	34
	Depth 26 km Z 17, E 63, N 37					eLR	12	32	04
31	eLR (SE)	03	27	04					
31	eLR (NW)	04	19	24					
31	eLQ	07	16	04	2	ePcP	00	14	04
	eLR (SW)	07	21	04		eS	00	17	12
						eLQ	00	19	44
						eLR (WNW)	00	22	04
						Inyo Co., Calif.			
						USCGS 00 04 16.3			
						37.2°N 118.6°W			Dist. 34.9°
						Depth 25 km	Mag 4 3/4-5		
						Z -, E 2.5, N 5.0			
31	eLR	16	09	04	2	eLQ	01	54	04
31	eLQ	19	03	04		eLR (NW)	01	58	04
	eLR	19	09	04		Philippines			
	Aleutians				2	eLR	09	02	04
						Santa Cruz Islands			
31	eLQ	21	55	04					
	eLR (W)	21	57	04	2	eLR	18	23	04
Feb. 1	eLQ	00	39	24					
	eLR (NW)	00	41	54	2	eLR	18	49	04
	Rg	00	43	34	2	eLR	20	42	04
1	eS	00	49	32	3	eLQ	02	50	04
	eSS	00	52	16		eLR	02	53	04
	eLQ	00	53	12					
	eLR (WNW)	00	54	34	3	eLR	05	41	04
	Lg	00	57	04					
	Rg	00	59	44	3	eLR	11	44	04
	Off coast Vancouver, B. C. USCGS 00 36 00.3					Near coast Central Chile			
	50.2°N 129.7°W				3	eLR	14	27	04
	(continued)					Honshu, Japan			

Palisades, New York		9			1961					
Date	Phase	h	m	s	Date	Phase	h	m	s	
Feb. 3	eLR	14	56	34	Feb. 5	eLQ	10	35	04	
	Argentina					eLR	10	37	34	
3	eLR (SE)	23	57	04	5	eLR	13	50	04	
4	eP	01	22	50	5	eP	15	45	14	
	epP	01	23	19		eS	15	50	48	
	eS	01	30	52		ePcS	15	51	04	
	eLR	01	42	04		eSS	15	53	16	
	Chile-Bolivia border					eLR (SW)	15	55	04	
	USCGS 01 13 05.0					South of Panama				
	18.3°S 69.3°W					USCGS 15 38 34.0				
	Depth 178 km					8.0°N 82.8°W				
						Dist. 33.8°				
						Depth 49 km				
						Mag 5-5 1/4				
4	eLQ	03	46	04		Z 11, E -, N 15				
	eLR	03	48	04						
					5	eSS	18	35	24	
4	e	07	00	48		eSSS	18	41	04	
	e	07	02	16		e	18	50	34	
	eLQ	07	04	24		eLQ	18	57	04	
	eLR (SW)	07	08	16		eLR (SE)	19	05	24	
						Indian Ocean				
4	eLR	09	55	04		USCGS 17 50 51.1				
	Northern Burma					38.4°S 78.2°E				
						Depth 25 km				
						Dist. 158.1°				
						Mag 5 3/4-6				
4	eLQ	13	28	04		Z 6, E 8, N 4.5				
	eLR	13	36	04						
					6	eLR	00	11	04	
4	eLQ	13	55	04						
	eLR	14	00	04		6	eLR	00	43	04
	Kamchatka									
						6	eLR	05	08	04
4	eLR	16	06	44						
	Fiji					6	eLR	07	25	04
4	ePS	19	38	28		Tonga Islands				
	ePPS	19	39	44						
	eSS	19	44	32						
	eSSS	19	48	14						
	eLQ	19	57	44						
	eLR	20	05	04						
	East coast Formosa									
	USCGS 19 09 12.9									
	24.0°N 122.7°E									
	Depth 14 km									
	Dist. 113.4°									
	Mag 5 3/4									
	Z -, E 6, N -									
4	eLR	21	33	04						
						6	e	11	53	54
5	eLR	00	52	04						
	Kurile Islands						e	11	59	38
							eLQ	12	10	04
							eLR	12	17	04

Palisades, New York		10				1961			
Date	Phase	h	m	s	Date	Phase	h	m	s
Feb. 6	eP	12	23	01	Feb. 7	eLR (NW)	03	58	04
	eS	12	31	40		Santa Cruz Islands			
	ePS	12	32	04					
	eScS	12	32	54	7	eLR	04	59	04
	eSS	12	36	04		Santa Cruz Islands			
	eLQ	12	39	04					
	eLR (NW)	12	42	04	7	eLR	06	28	34
	Andeanof Islands, Aleutians					Sumatra			
	USCGS	12	12	26.0					
	51.6°N 174.8°W	Dist. 64.9°			7	eLR	07	04	04
	Depth 77 km	Mag	5	1/4-5 1/2		Santa Cruz Islands			
	Z 4, E 5, N 6								
					7	eLR	07	19	04
6	eP	18	28	01					
	eS	18	38	40	7	eLR	15	08	04
	eLQ	18	53	44		Honshu, Japan			
	eLR	18	58	44					
	Kurile Islands				7	eLQ	16	29	35
	USCGS	18	15	21.6		eLR	16	36	05
	44.8°N 149.1°E	Dist. 86.1°				Formosa			
	Depth 25 km								
					7	eS	23	46	45
6	eLQ	21	28	04		ePS	23	47	05
	eLR	21	32	04		eLQ	23	55	35
						eLR (NW)	00	00	19
6	eP	22	00	44		Aleutians			
	ePKP	22	04	07		USCGS	23	27	10.8
	epPKP	22	04	21		51.4°N 177.2°W	Dist. 66.5°		
	ePP	22	05	52		Depth 15 km			
	ePKS	22	07	24					
	eSKS	22	11	12	8	ePS	03	07	25
	eSKKS	22	12	56		eSS	03	14	13
	ePPS	22	17	24		e	03	20	05
	eSS	22	23	00		e	03	22	05
	eSSS	22	26	44		eLQ	03	27	45
	eLQ	22	35	04		eLR	03	33	45
	eLR (NW)	22	43	04		New Hebrides			
	eLR <sub>2</sub> (SE)	23	36	04		USCGS	02	36	40.5
	Solomon Islands					15.3°S 167.5°E	Dist. 120.8°		
	USCGS	21	45	13.5		Depth 162 km			
	6.8°S 155.3°E	Dist. 124.9°							
	Depth 59 km				8	eP	08	12	24
6	e	22	41	25		epP	08	14	17
	e	22	41	47		ePP	08	17	25
7	eLR (NW)	01	55	04		eS	08	18	49
7	eLR (NW)	02	42	04		esS	08	22	25
	Santa Cruz Islands					e (S)	08	27	05
7	eLR (SW)	03	36	04		Brazil-Peru border			
						USCGS	08	04	13.8
						10.6°S 71.0°W	Dist. 51.8°		
						Depth 669 km			

Palisades, New York				11	1961					
Date	Phase	h	m	s	Date	Phase	h	m	s	
Feb. 8	eLR	18	19	06	Feb. 11	eS	11	46	44	
	Tonga Islands					eLR	11	53	06	
9	eLR	01	01	06		Argentina				
	Solomon Islands					USCGS 11 27 59.4				
						23.3°S 65.9°W				
						Depth 195 km				
9	eP	02	23	36						
	ePKP	02	27	06	11	ePKP	21	19	49	
	ePP	02	28	14		ePP	21	21	02	
	eSKS	02	33	42		eSKS	21	26	38	
	eSKKS	02	35	10		eSKKS	21	27	54	
	ePKKP	02	37	23		ePKKP	21	30	13	
	ePS	02	38	06		ePS	21	30	50	
	ePPS	02	39	18		ePPS	21	32	10	
	eSS	02	44	46		eSS	21	37	36	
	eSSS	02	49	06		e (SKKKS)	21	41	16	
	e (SSSS)	02	56	26		eLQ	21	50	26	
	eLQ	02	57	36		eLR (WSW)	21	56	26	
	eLR (WSW)	03	03	36		eLR <sub>2</sub> (ENE)	22	52	06	
	eLR <sub>2</sub> (ENE)	04	07	26		Kermadec				
	Kermadec					USCGS 21 01 06.4				
	USCGS 02 08 15.9					28.2°S 177.5°W				
	28.2°S 177.4°W					Dist. 117.2°				
	Depth 37 km					Depth 41 km				
	Z 10, E 15, N 6.5					Z 7, E 11, N 5.5				
9	eLR	09	01	06						
9	eLR	20	41	10		12	eP	01	31	33
9	eLR	21	34	06		eS	01	41	46	
	Java					ePS	01	42	34	
						eSS	01	46	46	
						eLQ	01	53	26	
						eLR (SW)	01	58	46	
						Easter Island region				
						USCGS 01 19 21.8				
10	eLQ	14	24	46		34.8°S 106.9°W				
	eLR	14	28	36		Depth 100 km				
	Ceram Sea					Z 2, E 2, N 2.5				
10	eLR	17	30	06						
11	eLR (NW)	01	56	06	12	eS	04	02	54	
11	eLR	03	32	06		eLQ	04	06	14	
	Marianas					eLR	04	09	18	
						Mexico-Arizona border				
						USCGS 03 51 14.6				
						31.0°N 109.1°W				
						Depth 63 km				
11	eS	06	35	54						
	ePS	06	36	12	12	eLQ	14	17	06	
	eSS	06	38	46		eLR	14	21	06	
	eLQ	06	43	46		Alaska				
	eLR (SE)	06	46	46						
					12	eLR	16	39	06	
						Banda Sea				

Palisades, New York				12		1961			
Date	Phase	h	m	s	Date	Phase	h	m	s
Feb. 12	eP	22	06	30	Feb. 13	eP	16	40	10
	iP	22	06	33		epP	16	40	20
P (Z)	11 sec 5 mic comp					ePP	16	43	44
	epP	22	06	44		ePPP	16	45	38
	ePP	22	09	50		eS	16	50	46
	ePPP	22	11	50		eSKKS	16	51	06
	eSKS	22	16	54		ePS	16	51	58
	eS	22	16	58		eSS	16	57	06
	eSS	22	23	50		eLQ	17	05	26
	eLQ	22	29	06		eLR (NNW)	17	10	06
	eLR (NNW)	22	35	06		Kurile Islands			
	Kurile Islands					USCGS	16	27	20.9
	USCGS	21	53	43.5		43.7°N 149.6°E			Dist. 86.6°
	43.7°N 147.6°E					Depth 25 km	Mag 5	1/2-5	3/4
	Depth 45 km					Z 4, E 6, N 6			
	Z 100, E 77, N 130*								
12	eP	23	39	22	13	eLQ	23	22	26
	epP	23	39	35		eLR	23	25	06
	eS	23	49	52		Kurile Islands			
13	eLQ	00	01	06	14	eLQ	03	23	06
	eLR	00	07	06		eLR	03	28	06
	Kurile Islands								
	USCGS	23	26	34.5	14	eP	03	34	51
	44.0°N 147.7°E					epP	03	35	04
	Depth 23 km					ePP	03	37	22
13	eLR	04	56	06		eS	03	43	50
	Solomon Islands					eScS	03	45	18
						e (SS)	03	46	22
13	ePP	07	04	36		eLQ	03	49	26
	ePKS	07	07	56		eLR (SSW)	03	52	06
	eSKS	07	10	38	14	eLQ	04	00	26
	eSKS <sub>2</sub>	07	11	08		eLR (NW)	04	06	06
	eSKKS	07	12	02		Kurile Islands			
	ePS	07	13	44	14	eLQ	06	22	06
	ePPS	07	14	48		eLR	06	27	06
	eSS	07	19	46		Near coast southern Chile			
	eSKKS	07	23	26	14	eLR (NW)			
	eLQ	07	30	30		Samoa Islands region			
	eLR (NW)	07	36	26	15	eLR (SW)	00	02	06
	eLR <sub>2</sub> (SE)	08	51	06					
	Tonga Islands				15	eLR (SW)	01	30	06
	USCGS	06	45	25.0					
	17.0°S 173.7°W								
	Depth 43 km								
	Z 6, E 9, N 5.5								
13	e	07	30	23					
	e	07	31	51					

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Palisades, New York				14			1961		
Date	Phase	h	m	s	Date	Phase	h	m	s
Feb. 20	eLR (NW)	13	25	07	Feb. 23	eS	04	40	41
						eSS	04	47	17
20	eLR (NW) New Ireland	15	17	07		eSSS	04	54	07
						e(SKKKS)	04	57	27
20	eLR	16	18	07		eLR (N)	05	00	47
					Honshu, Japan				
					USCGS 04 16 25.				
20	eP	18	37	07		38.2°N 142.7°E			
	eS	18	46	23		Depth 119 km			
	e(ScS)	18	47	17		Z 2.5, E 5.5, N 4.5			
	e (PKKP)	18	55	51					
	eLR (SSE)	19	00	37	23	eLR (NE)	22	26	06
					Turkey				
20	eP	22	35	07					
	eS	22	41	39	24	eLR	02	34	06
	e	22	43	27		Solomon Islands			
	eSS	22	44	55					
	eLQ	22	45	55	24	ePS	03	33	31
	eLR (SSW)	22	48	07		eSS	03	39	16
	Ecuador					eLQ	03	53	14
	USCGS 22 27 00.4					eLR (NE)	03	57	32
	2.5°S 77.6°W				24	Ryukyu Islands			
	Depth 50 km					USCGS 03 04 11.7			
						26.1°N 125.4°E			
21	eL	16	41	07		Depth 25 km			
21	eLR	21	39	07	24	eLR	08	48	06
22	eL Aleutians	03	21	27		Western Bolivia			
22	e	08	48	19	24	eLQ	22	34	06
22	eLR	17	05	07		eLR	22	37	06
22	ePP	22	13	39					
	eSKKS	22	20	23	25	eLR	02	18	06
	ePS	22	23	27		New Hebrides			
	ePPS	22	24	35	25	eLR (SW)			
	eSS	22	30	11					
	eSKKKS	22	34	17	25	eSS	11	45	16
	eLQ	22	42	37		eLQ	15	36	20
	eLR (WSW)	22	48	37		eLR (NW)	15	49	06
	Kermadec Islands region					Samoa			
	USCGS 21 53 34.5					USCGS 15 02 04.8			
	28.4°S 177.2°W					15.4°S 175.8°W			
	Dist. 117.2°					Dist. 108.7°			
	Depth 78 km					Depth 62 km			
	Mag 5 1/2-5 3/4					Z 2.5, E 3.5, N 2.0			
	Z 8, E 6, N 2								
23	eLR	04	12	43	25	eLR	17	16	06

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Date	Phase	h	m	s	Date	Phase	h	m	s
Feb. 25	e	20	53	16	Feb. 28	e	04	03	37
	e	20	53	36					
26	eP	06	01	06	28	e (PS) e (PPS)	08	13	56
	eS	06	11	16		e (SS)	08	20	36
	eScS	06	11	34		eLQ	08	33	26
	ePS	06	12	06		eLR	08	40	06
	eSS	06	16	46					
	eSSS	06	19	54	28	eLQ	13	23	06
	eLQ	06	23	06		eLR	13	28	06
	eLR (SW)	06	25	36		Kurile Islands			
	Easter Island region								
	USCGS 05 48 46.3				28	eS	21	37	38
	32.7°S 111.2°W	Dist.	81.2°			eLQ	21	44	50
	Depth 29 km	Mag	5 1/2-5 3/4			eLR	21	50	26
	Z 3.5, E 7.0, N 5.0								
26	eP	18	24	50		24.1°S 66.6°W			Dist. 65*
	P (Z) 16 sec 4 mic comp	NNW				Depth 30 km			
	ePP	18	29	06					
	ePPP	18	31	26	Mar. 1	eLR	00	12	06
	eSKS	18	35	26					
	eSKKS	18	36	06	1	eLR	08	10	06
	eS	18	36	34					
	ePKKP	18	40	26	1	eLR	10	41	06
	eSS	18	44	06					
	eSSS	18	49	06	1	eLR	12	42	06
	eLQ	18	54	06					
	eLR (NNW)	18	58	46	1	eLR	14	43	06
	Near Kyushu, Japan					Near Java			
	USCGS 18 10 48.7								
	31.4°N 131.2°E	Dist.	104.7°		1	eLQ	20	19	06
	Depth 54 km	Mag	7 1/4			eLR	20	26	06
	Z 115, E 125, N 135*					Marianas Islands			
27	eLQ	09	28	06	1	ePP	23	54	06
	eLR	09	31	06		eS	23	59	32
27	eLR	11	09	06	2	eSS	00	03	20
	Southern Chile					eLQ	00	05	24
						eLR (SW)	00	08	26
27	eP	18	07	06		1500 km west of Galapagos Islands			
	eLR	18	56	46		USCGS 23 42 43.8	Dist.	52.7	
	Tadzik, SSR					2.8°S 105.7°W	Depth	59 km	
	USCGS 17 53 35.9					Z 3.5, E 2, N 4	Mag	5	
	38.4°N 74.7°E	Dist.	96.3°		2	eLR	00	27	06
	Depth 48 km					Mexico-Guatemala border			
27	eLR	22	18	06	2	eLR	02	45	06
	Aegean Sea								
					2	eLR	05	09	06

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Date	Phase	h	m	s	Date	Phase	h	m	s
Mar. 2	eLR	10	08	46	Mar. 5	ePKP	01	45	13
	Solomon Islands					ePKP	01	45	24
2	eLR	13	02	36		ePS	01	56	54
2	eS	15	35	39		eSS	02	03	32
	ePS	15	36	07		e(PKPPKP)	02	04	24
	eSS	15	39	51		e(PKPPKS)	02	08	12
	eLQ	15	41	53		eSS	02	12	14
	eLR (SW)	15	45	25		eLQ	02	17	44
	Pacific Ocean w. of Galapagos					eLR (NW)	02	23	34
	USCGS 15 18 54.3					Solomon Islands region			
	4.7°S 106.3°W	Dist.	54.4°			USCGS 01 26 26.1			
	Depth 25 km					10.7°S 161.6°E			
						Depth 99 km			
	Z 3.5, E 3, N 3.5					Z 6, E 8.5, N 6			
3	eLR	03	24	45	5	eLR	03	20	04
3	eLR	04	19	05	5	Java			
	New Hebrides								
3	eSS	07	03	15	5	e	19	21	14
	eSSS	07	09	05	5	eLR	20	55	04
	eLQ	07	19	25	6	New Guinea			
	eLR (NW)	07	24	35	6	eP	06	35	04
	Loyalty Islands				6	e	12	15	30
	USCGS 06 25 37.9				6	e	12	16	01
	22.9°S 171.4°E	Dist.	123.3°		6	e	12	16	48
	Depth 27 km				6	eS	12	16	54
	Z 2, E 3, N 2.5				6	Lg	12	17	44
3	eLR (SW)	09	15	05		Ontario Prov., Canada			
	Kermadec					USCGS 12 13 31			
						48.1°N 80°W			
						Dist. 8.23°			
3	eS	23	14	21		Depth 49 km			
	eSS	23	20	05	7	eLR	00	03	04
	eLQ	23	25	59	7	eLR	05	20	04
	eLR	23	31	45		Bonin Islands			
	Near coast southern Chile								
	USCGS 22 51 15.6								
	44.1°S 74.8°W	Dist.	84.6°		7	eP	06	55	44
	Depth 95 km				7	ePP	06	59	06
4	eLR	00	37	05	7	e	07	05	20
	Central Chile				7	eS	07	06	12
4	eLQ	21	23	04	7	eSP	07	07	04
	eLR (SW)	21	25	04	7	ePPS	07	07	44
	Near coast of El Salvador				7	eSS	07	11	52
					7	eSSS	07	15	24
					7	eLQ	07	18	32
					7	eLR (SSE)	07	22	34
					7	G <sub>2</sub>	08	37	44

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Date	Phase	h	m	s	Date	Phase	h	m	s
Mar. 7 (cont'd)	Off coast of Chile				Mar. 7 (cont'd)	ePPS	23	44	24
	USCGS 06 43 10.6					eSS	23	49	58
	43.3°S 80.4°W					e	23	54	04
	Depth 60 km					eLQ	00	04	24
						eLR (NW)	00	11	34
7	eP	10	25	36		New Britain region			
	ePKP	10	29	20		USCGS 23 11 59.6			
	ePP	10	30	24		4.7°S 153.2°E			
	e	10	31	44		Depth 90 km			
	ePKS	10	33	04					
	eSKS	10	36	12	8	eLR	04	35	04
	eSKKS	10	37	28		New Guinea			
	e	10	38	22					
	e	10	39	30	8	eLR	06	27	04
	ePS	10	40	12		Kermadec			
	ePKKS	10	44	08					
	eSS	10	46	24	8	eLR	10	04	04
	e	10	49	34					
	eSSS	10	51	14	8	eLQ	13	33	04
	eLQ	10	57	34		eLR	13	39	04
	eLR (WSW)	11	05	24		Near coast of Chile			
	Kermadec Islands								
	USCGS 10 10 38.9				9	eP	04	06	56
	28.2°S 175.7°W					ePcP	04	08	44
	Depth 43 km					eS	04	13	12
	Mag 7 - 7 1/4					eLQ	04	16	24
	Z 95, E 85, N 115*					eLR (SE)	04	18	04
7	ePKP	19	28	40		Atlantic Ocean			
	ePKP	19	29	22		USCGS 03 59 08.7			
	ePP	19	32	56		10.9°N 41.7°W			
	eSKS	19	36	30		Depth 27 km			
	eSKSP	19	43	32		Z 3, E 3.5, N 5			
	ePPS	19	46	08					
	eSKSP	19	48	12	9	eLR	09	27	04
	eSS	19	53	16					
	eSKSSKS	19	53	56	9	eLQ	13	17	34
	e	19	54	44		eLR (SW)	13	18	54
	e	19	58	24					
	e	20	08	20	9	eLQ	14	14	34
	eLQ	20	14	24		eLR (SW)	14	16	04
	eLR (SE)	20	23	14					
	eLR <sub>2</sub> (NW)	20	49	24	9	e	15	00	11
	Indian Ocean					e	15	00	41
	USCGS 19 08 36.1					e	15	00	44
	38.2°S 78.1°E					e	15	01	29
	Depth 30 km								
	Mag 6								
	Z 8, E 9, N 5				9	e	22	04	53
						eLQ	22	10	03
7	ePP	23	32	54		eLR (SW)	22	14	03
	ePKKP	23	41	04					

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Date	Phase	h	m	s	Date	Phase	h	m	s
Mar. 10	eSS	03	41	51	Mar. 12	eLQ	03	05	02
	e	03	47	43	(cont'd)	eLR (WSW)	03	08	02
	e	03	51	23		Off coast Mexico			
	eLR	04	01	03		USCGS 02 49 33.4			
	Macquarie Island region					17.4°N 107.3°W			Dist. 37.2°
	USCGS 03 00 43.3					Depth 57 km			
	51.9°S 161.6°E					Z 3, E 4, N 6.5			
	Depth 25 km								
10	e	23	17	52	12	eLQ	12	26	02
	eS	23	24	16		eLR	12	32	02
	eLR (SE)	23	28	02		Off coast Mexico			
	Near coast of Costa Rica				12	eLR	15	23	02
	USCGS 23 12 20.4					Off coast Oregon			
	10.1°N 83.6°W								
	Depth 56 km				12	e	18	46	51
						e	18	47	14
11	eP	01	43	42					
	e	01	53	46	12	eLR	19	39	02
	eS	01	54	14					
	ePS	01	54	38	12	ePP	23	41	42
	ePPS	01	54	58		ePS	23	51	06
	eSS	01	59	18		eSS	23	57	54
	eSSS	02	03	52	13	eSKKKS	00	02	22
	eLQ	02	05	42		eSSS	00	04	02
	eLR (NW)	02	10	02		eLQ	00	10	02
	Kurile Islands					eLR (SW)	00	16	02
	USCGS 01 31 34.4					Tonga Islands region			
	48.7°N 154.6°E					USCGS 23 21 42.5			
	Depth 26 km					28.4°S 176.0°W			Dist. 116.4°
	Z 5.5, E 13, N 7					Depth 113 km			Mag 5 1/2- 5 3/4
						Z 4, E 5.5, N 2.5			
11	e (S)	09	06	02					
	ePPS	09	08	26	13	eLR (NW)	05	56	02
	eSS	09	13	50		New Britain			
	e	09	17	22					
	eLQ	09	23	02	13	eP	08	10	40
	eLR (E)	09	28	02		ePP	08	11	52
	British Somaliland					ePPP	08	12	12
	USCGS 08 41 00.0					e	08	15	16
	11.2°N 43.3°E					eS	08	16	18
	Depth 18 km					ePcS	08	16	54
	Z 3, E 4, N 3					eSS	08	18	42
11	eLQ	19	55	02		eLQ	08	19	10
	eLR	19	57	32		eLR (WSW)	08	21	02
						Off west coast Mexico			
						USCGS 08 03 43.9			
11	eP	22	00	45		19.2°N 107.3°W			Dist. 35.7°
	eS	22	01	07		Depth 49 km			Mag 6
12	eS (continued)	03	02	30		Z 12, E 25, N 80			

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Date	Phase	h	m	s	Date	Phase	h	m	s
Mar. 13	e	10	57	54	Mar. 15	eLQ eLR	23	13	02
13	eLQ	19	50	02			23	16	02
	eLR	19	55	02	15	eLR	23	46	02
	Crete				16	e	05	00	02
13	e	20	51	02		Kermadec			
	eSKS	20	59	56					
	epS	21	02	28	16	e	05	09	07
	eLR (SE)	21	24	02		eLQ	05	29	42
	Sandwich Islands					eLR (NW)	05	35	02
	USCGS 20 35 15.4								
	56.2°S 27.2°W				16	eLR	07	44	02
	Depth 56 km					Sunda Strait			
13	eLR (NW)	22	02	02	16	eLR	08	47	02
	Fiji					Tonga Islands			
14	eLQ	01	57	22	16	ePPS	11	54	22
	eLR (NW)	02	01	32		eSS	12	01	02
	Japan					eLQ	12	19	02
14	eLR	03	21	42		eLR	12	26	22
						Banda Sea			
						USCGS 11 19 43.5			
14	eLQ	12	26	02		6.4°S 130.7°E			
	eLR (NW)	12	31	42		Depth 77 km			
	Bering Strait				16	ePKP	14	05	05
	USCGS 11 58 53.9					iPKP <sub>1</sub>	14	05	07
	67.8°N 164.9°W					ePKP <sub>2</sub>	14	05	34
	Depth 78 km					epPKP <sub>2</sub>	14	06	34
14	eLR	20	45	32		ePKKP	14	14	58
						ePKKS	14	18	22
15	eSKS	10	41	22		ePPS	14	21	02
	ePKKP	10	44	02		e (PKPPKP)	14	22	30
	ePKKS	10	47	32		eSS	14	27	02
	eSS	10	52	34		e	14	31	42
	e	11	05	12		eLQ	14	45	22
	eLQ	11	07	02		eLR <sub>(N)</sub>	14	53	32
	eLR (NW)	11	14	02		eLR <sub>1</sub> <sup>2</sup> (S)	15	26	42
	New Ireland region					Flores Island			
	USCGS 10 14 55.5					USCGS 13 45 35.6			
	3.3°S 150.7°E					8.2°S 122.0°E			
	Depth 21 km					Dist. 144.2			
	Z 7.5, E 8.5, N 10					Depth 74 km			
						Mag 6 1/4-6 1/2			
						Z 10, E 13, N 16			
15	eLQ	13	53	32	16	ePKP	18	40	46
	eLR	13	59	22		eSS	19	02	46
	New Britain					e	19	04	32
15	eLR	18	55	02		e	19	08	26
						e	19	14	02
						eLQ	19	21	02
						eLR (N)	19	25	32

Palisades, New York				20			1961		
Date	Phase	h	m	s	Date	Phase	h	m	s
Mar. 16	Flores Island				Mar. 17 eLR (SW)				23 21 22
(cont'd)	USCGS 18 21 12.2				18	ePKP	02	28	12
	8.1°S 122.0°E	Dist. 144.2°				eSS	02	49	02
	Depth 43 km					eSKSSKS	02	51	02
16	eLR	21	06	02		eLQ	03	08	18
	Tonga Islands					eLR	03	17	02
16	eLR	23	34	02	Flores Islands				
	Tonga Islands				USCGS 02 08 38.5				
					8.2°S 122.0°E	Dist. 144.8°			
					Depth 35 km				
17	e	00	00	02					
	eLR	00	11	32	18	eSS	09	02	42
	Tonga Islands					eSSS	09	07	22
17	eLR	00	43	02		eLQ	09	17	02
17	eLR	06	05	02		eLR (SW)	09	22	32
17	eLR	13	15	02	Tonga Islands				
					USCGS 08 26 49.0°				
					24.3°S 174.2°W	Dist. 112.6°			
					Depth 25 km				
17	eSKS	14	31	22					
	ePS	14	36	02	18	ePKP	15	14	44
	eSS	14	42	38		eSS	15	36	22
	eLQ	14	55	02		ePKPPKS	15	39	34
	eLR (SW)	15	02	02		e	15	41	12
	Tonga Islands					eSSS	15	44	42
	USCGS 14 06 51.6					eSS <sub>2</sub>	15	48	02
	23.7°S 176.0°W	Dist. 114.2°				eLQ	15	52	02
	Depth 49 km					eLR (WSW)	15	59	22
	Z 5, E 2.5, N 6				South of New Zealand				
					USCGS 14 54 59.3				
17	eLR (W)	17	15	42	49.9°S 163.3°E	Dist. 140°			
					Depth 38 km				
17	eLR	19	12	02					
					Z 19, E 14, N 18*				
17	ePP	20	30	38	18	eLQ	23	27	02
	eSKS	20	36	02	19	eLR (NW)	00	03	02
	ePS	20	39	48					
	eSS	20	46	18	19	iPKP	05	18	48
	e	20	50	22		ePPS	05	35	02
	e	20	56	12		e	05	36	14
	eLQ	20	57	32		eSS	05	42	02
	eLR (SW)	21	04	34		e	05	47	34
	Tonga Islands region					e	06	01	46
	USCGS 20 10 36.4					eLQ	06	07	42
	24.3°S 175.6°W	Dist. 114.2°				eLR (NNE)	06	13	22
	Depth 79 km					Sunda Strait			
	Z 9, E 11, N 4					USCGS 04 59 19.3			
						6.4°S 105.5°E	Dist. 145°		
						Depth 120 km			
17	eLR	22	19	02					

**Palisades, New York**

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Palisades, New York						23	1961		
Date	Phase	h	m	s	Date	Phase	h	m	s
Mar. 28	eLR	06	36	03	Mar. 28	Depth 125 km			
	Aleutian Islands				(cont'd)	Z 2, E 3.5, N 3.5	Mag 5-5 1/4		
28	eP	09	52	19	28	eLR	23	11	02
	ePKP	09	54	57					
	iPKP	09	55	13	29	eLR	07	25	02
	ePP	09	57	43		Honshu, Japan			
	iPKS	09	58	35					
	epPKS	09	59	21	29	eLR	10	57	02
	ePPS	10	10	35		Northern Celebes			
	eSS	10	16	19					
	eLQ <sub>1</sub>	10	32	53	29	eLQ	18	57	02
	eLR <sub>1</sub> (NNW)	10	41	43		eLR	19	01	02
	eLQ <sub>2</sub>	11	09	03		Honshu, Japan			
	eLR <sub>2</sub> (SSE)	11	21	03	30	eLR	00	19	02
	Northern Celebes								
	USCGS 09 35 55.4				30	eLR	01	34	02
	0.2°N 123.6°E								
	Depth 83 km				Dist. 136.1°				
	Z 28, E 25, N 52*				Mag 7				
28	iP	12	39	53	30	eP	07	49	42
	iS	12	48	35		ePP	07	50	42
	eSS	12	53	03		eS	07	55	18
	eLQ	12	56	03		ePcS	07	55	46
	eLR (NW)	13	01	03		eLQ	07	57	22
	Andreanof Islands, Aleutians					eLR (WSW)	07	59	42
	USCGS 12 29 12.7					Lg	08	01	02
	51.7°N 176.2°W					Rg	08	04	02
	Depth 60 km					Gulf of California			
	Z 8, E 13, N 10					USCGS 07 42 59.4			
						22.0°N 107.8°W			
						Depth 20 km			
						Z 9, E 14, N 13			
28	eLR	18	15	02	30	eSKS	09	14	46
28	eLR	20	29	02		eSKKKS	09	16	02
28	iP Dil from S.	21	12	16		ePS	09	17	42
	epP	21	12	35		ePPS	09	18	42
	ePcP	21	12	47		eSS	09	23	36
	epPcP	21	12	58		eSKKS	09	27	22
	ePP	21	14	42		e (PKPPKP)	09	28	10
	ePcS	21	16	58		e (PKPSKS)	09	33	54
	iS	21	20	38		eLQ	09	35	32
	eScS	21	21	28		eLR <sub>1</sub> (NW)	09	40	22
	eSS	21	23	50		eLR <sub>2</sub> (SE)	10	50	02
	eLQ	21	28	10		Samoa Islands region			
	eLR (SSE)	21	31	32		USCGS 08 49 45.6			
	Chile-Bolivia border region					15.2°S 172.8°W			
	USCGS 21 01 56.2					Dist. 106.5°			
	22.0°S 68.0°W					Depth 25 km			
	(continued)					Z 5.5, E 7, N 3.5			
					30	eLR	11	02	02

Palisades, New York				24		1961			
Date	Phase	h	m	s	Date	Phase	h	m	s
Mar. 30	eLQ	13	01	02	Apr. 4	e (LQ)	10	26	01
	eLR	13	05	02	(cont'd)	eLR (NNE)	10	31	31
					Sinkiang Province, China				
31	eLQ	21	52	22		USCGS 09 46 36.6			
	eLR	21	56	02		40.1°N 77.8°E			
					Depth 16 km				
Apr. 1	ePP	15	35	40		Z 13.5, E 8, N 12*			
	ePPP	15	37	38					
	eSKS	15	42	24	4	eLR	20	21	01
	ePS	15	44	20					
	ePPS	15	44	36	4	eLR	21	50	01
	eSS	15	49	44					
	eSSS	15	53	34	5	eLR (NW)	05	27	01
	eLQ	15	57	32					
	eLR (NNE)	16	03	02	5	eP	07	00	01
	Sinkiang Province, China					eLR	07	38	01
	USCGS 15 18 22.8					Sinkiang, China			
	39.6°N 77.7°E				5	eL	09	25	01
	Depth 21 km								
	Z 15, E 8, N 18*				5	eLR	19	10	01
2	eLR	01	15	02					
2	eLR	09	11	22	5	e	20	40	32
2	eLR	09	21	22		e	20	40	54
2	eLQ	15	20	22	5	eLR	22	43	01
	eLR (W)	15	24	22		Macquarie Island region			
	700 km NW of Easter Island				6	eLQ	02	16	01
						eLR (NE)	02	19	31
	Sinkiang, China								
2	eLQ	21	38	12	6	eP	04	12	03
	eLR	21	45	22		eS	04	17	57
2	eLR	23	32	02		ePcS	04	18	21
3	eS	08	05	42		eSS	04	20	35
	eLQ	08	07	02		eLQ	04	21	31
	eLR (SW)	08	08	12		eLR (WNW)	04	24	01
	North of Swan Island, Carib. Sea					Near coast of Northern California			
	USCGS 07 55 52.1					USCGS 04 04 46.1			
	17.5°N 84.1°W					40.1°N 124.8°W			
	Dist. 24.5°					Dist. 38.4°			
	Depth 92 km					Depth 73 km			
4	eLR	02	03	31	6	eLQ	12	54	01
	China					eLR	12	57	01
4	eSKS	10	10	41	6	eLQ	15	08	22
	ePS	10	12	47		eLR (NE)	15	14	02
	ePPS	10	13	13		Near coast of Sumatra			
	eSS	10	18	17	6	eLQ	18	55	02
	eSSS	10	22	05		eLR (NE)	19	00	02
	(continued)					Southern Iran			



Palisades, New York

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Palisades, New York				27		1961					
Date	Phase	h	m	s	Date	Phase	h	m	s		
Apr. 15	eLQ		01	13	33	Apr. 17	eLQ		00	14	03
	eLR		01	18	03		eLR		00	20	03
	Honshu, Japan					South coast New Guinea					
15	eLQ		02	18	03	17	e		02	53	29
	eLR		02	21	03		eLQ		03	10	23
15	eLR		07	23	03		eLR		03	15	03
15	eLQ		10	31	03	17	eLR		04	31	33
	eLR		10	35	33	17	eLR		07	54	33
	Kermadec Islands										
15	eL		12	46	03	17	eLQ		13	54	03
							eLR		14	01	03
15	eLR		18	50	03	17	i		14	29	14
16	eLR		01	02	33	17	i		16	14	36
16	eLQ		05	17	03	17	eLQ		16	43	23
	eLR		05	19	03		eLR (SE)		16	46	17
	Central Utah					Mid Atlantic					
	USCGS 05 02 39.3					USCGS 16 21 10.2					
	39.1°N 111.5°W					3.9°N 31.5°W					
	Depth 35km										
16	eLR		09	08	03	17	eP		20	46	03
							eS		20	53	33
							eLQ		21	00	37
16	eP		11	52	24		eLR (S)		21	04	23
	eLR		12	08	03		Chile-Bolivia border				
	Kamchatka					USCGS 20 35 15.4					
	USCGS 11 40 40.7					20.8°S 68.5°W					
	53.5°N 158.7°E					Dist. 61.8°					
	Depth 27 km					Depth 200 km					
16	eSS		12	39	11	18	eLQ		05	08	33
	eLQ		12	41	03		eLR		05	11	43
	eLR (WNW)		12	43	23	18	eLQ		05	47	03
	Off northwest coast Vancouver Isl.						eLR		05	53	03
	51.6°N 130.6°W										
	Dist. 39.8°										
	Depth 50 km					18	eLR		09	21	03
	USCGS 12 22 47.1						Kurile Islands				
16	eLQ		12	58	03						
	eLR (NW)		13	05	33	18	eLR		13	20	03
16	eLQ		17	46	03	18	eLR		14	52	03
	eLR		17	50	03		Banda Sea				
16	eLQ		22	40	03	18	e		19	11	35
	eLR		22	46	03		e		19	20	03
							eLQ		19	25	03
							eLR (SE)		19	31	03



## Palisades, New York

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Date	Phase	h	m	s	Date	Phase	h	m	s
Apr. 21	ePPP	19	47	33	Apr. 22	eLR (S)	19	26	23
	e	20	03	33		Near coast of Ecuador			
	eLR	20	10	23		USCGS 19 01 34.4			
	Kurile Islands					2.8°S 80.8°W			
	USCGS 19 30 36.9					Depth 30 km			
	48.1°N 154.6°E				22	eLQ	19	51	03
	Depth 23km					eLR (NW)	19	58	33
21	e	20	37	03		New Britain region			
21	eSS	20	39	19	22	e	20	28	37
	eSSS	20	43	03		e	20	28	57
	eLQ	20	46	33					
	eLR (NW)	20	51	03	23	eLR	03	32	03
	Kurile Islands								
	USCGS 20 10 38.3								
	47.7°N 154.6°E				23	eSKS	05	40	11
	Depth 27 km					ePPS	05	44	57
	Z 3, E 4, N 3.5					eSS	05	49	03
21	e	21	16	51		eLQ	05	59	43
						eLR	06	07	43
21	eP	21	37	19		Ruykyu Islands			
	epP	21	37	33		USCGS 05 14 31.1			
	eS	21	45	57		26.2°N 129.8°E			
	ePS	21	46	09		Depth 110 km			
	eScS	21	46	59	23	eP	09	14	21
	eSS	21	50	23		8 sec 2.5 mic NNW			
	eLQ	21	55	33		ePP	09	17	39
	eLR (NW)	22	00	33		eS	09	24	47
	Aleutian Islands					ePPS	09	25	43
	USCGS 21 26 42.1					eSS	09	30	41
	51.7°N 173.9°W					ePKKS	09	34	55
	Dist. 64.4°					eSSS	09	37	17
	Depth 36 km					eLQ	09	39	03
	Mag 5 1/4-5 1/2					eLR	09	44	13
	Z 3, E 4, N 5								
22	e	01	08	33		Kurile Islands			
	e	01	11	03		USCGS 09 01 41.8			
	e	01	13	23		44.6°N 150.2°E			
	e	01	16	43		Depth 44 km			
	eLQ	01	22	15		Z 42, E 39, N 57.5			
	eLR (NW)	01	29	03	23	eLQ	15	40	03
						eLR	15	46	33
22	eLR (SE)	02	20	33					
22	e	17	01	51	23	eS	17	14	07
	e	17	01	56		eSS	17	19	53
	e	17	02	31		eLQ	17	29	15
						eLR (NW)	17	35	03
22	e (P)	19	10	10		Kurile Islands			
	eS	19	16	31		USCGS 16 51 03.6			
	eSS	19	19	37		44.5°N 150.1°E			
	(continued)					(continued)			



Palisades, New York				31		1961			
Date	Phase	h	m	s	Date	Phase	h	m	s
Apr. 28	eLQ	01	20	02	Apr. 30	e	04	59	11
	eLR	01	25	02		eLQ	05	04	21
	Monterey Co., Calif.					eLR	05	05	31
	USCGS 01 02 52.2								
	36.3°N 121.6°W		Dist. 37.6°		30	eLQ	05	28	31
	Depth 41 km					eLR	05	33	01
28	eLR	06	47	02	30	eP	07	40	21
						eS	07	45	19
28	eLQ	07	35	42		eLQ	07	46	01
	eLR	07	38	02		eLR (NE)	07	48	01
	North Atlantic Ocean								
28	eL	09	09	02		USCGS 07 33 53.5			
	South Bolivia					52.0°N 31.9°W			
						Depth 38 km			
28	eLQ	14	18	02		Z 11, E 14, N 10			
	eLR	14	22	22	30	eP	11	28	11
28	e	20	57	22		eS	11	38	27
	e	20	57	34		eSS	11	44	21
29	eLR	00	14	41		eLQ	11	51	11
						eLR (NW)	11	57	01
	Kurile Islands								
29	eLQ	06	42	01		USCGS 11 15 19.8			
	eLR	06	47	01		44.6°N 149.7°E			
						Depth 70 km			
29	eP	09	27	06		Mag 5 1/2-5 3/4			
	epP	09	27	14		Z 7.5, E 5, N 8			
	ePP	09	28	37	30	e	14	27	45
	eS	09	33	11		eLR (NW)	14	34	01
	eSS	09	36	29					
	eLR (WNW)	09	39	31	30	eSKKS	15	13	45
	(Rg)	09	43	51		ePS	15	16	39
	Off coast N. California					ePPS	15	17	27
	USCGS 09 19 28.3					eSS	15	22	27
	40.6°N 127.5°W		Dist. 40.2°			e (SSS)	15	30	21
	Depth 26 km					eLQ	15	33	01
	Mag 5 1/2-5 3/4					eLR (WNW)	15	39	01
	Z 23, E 23, N 27					Samoa Islands region			
29	eLQ	09	47	01		USCGS 14 48 11.5			
	eLR (NE)	09	51	01		15.3°S 174.4°W			
	USCGS 09 29 09.5					Depth 25 km			
	71.3°N 7.4°W		Dist. 44.4°			Z 6, E 7, N 4			
	Depth 14 km								
	Mag 5 1/2-5 3/4								
	Z 10.5, E 20, N 20				30	e	16	29	03
	Jan Mayen Island region								
29	eLQ	17	12	21	30	eS	17	44	27
	eLR	17	16	01		eLR (NW)	17	49	01
						Off coast northern California			
30	eLQ	01	29	21		USCGS 17 30 38.6			
	eLR	01	35	31		(continued)			



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Palisades, New York

Date Phase h m s

Apr. 30 40.7°N 127.2°W Dist. 40.2°

(cont'd) Depth 44 km

30 eLR (NW) 18 55 01

30 eL 22 38 41

35P.

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